

4.8 HYDROLOGY AND WATER QUALITY

This section describes existing hydrology and water quality conditions within the SP area and vicinity, identifies associated regulatory requirements and industry standards, evaluates potential impacts related to implementation of the proposed project, and identifies associated mitigation measures where appropriate. A preliminary Drainage Report and a preliminary Storm Water Management Plan (SWMP) have been prepared for the proposed project by Hofman Planning & Engineering (Hofman; 2012c and 2012d, respectively). Applicable information from these studies is summarized below along with other pertinent data, with the complete reports included in Appendix D of this EIR.

4.8.1 Environmental Setting

Watershed and Drainage Characteristics

The SP area is within the Carlsbad Hydrologic Unit (HU), 1 of 11 such drainage areas designated in the 1994 (as amended) San Diego Regional Water Quality Control Board (RWQCB) Basin Plan (Basin Plan). The Carlsbad HU is a roughly triangular-shaped area of approximately 210 square miles, and extends from east of Lake Wohlford to Solana Beach-Carlsbad along the coast (Figure 4.8-1, *Project Location within Local Hydrologic Designations*). The Carlsbad HU is divided into a number of hydrologic areas and subareas based on local drainage characteristics, with the SP area located within the Buena Vista Creek Hydrologic Area (HA) and the El Salto Hydrologic Subarea (HSA). The Carlsbad HU is drained by several moderate size creeks, with Buena Vista Creek comprising the primary drainage course in the Buena Vista Creek HA and El Salto HSA. Buena Vista Creek is located just north of the SP area, and continues generally west for approximately 0.2 mile before entering Buena Vista Lagoon. Annual precipitation in the Carlsbad HU ranges from approximately 11 inches along the coast to over 25 inches in the Laguna Mountains, with the SP area vicinity receiving approximately 11.1 inches per year (RWQCB 1994, Weather.com 2010).

Previous development of the SP area involved the construction of generally level building pads and related commercial structures/pavement, with approximately 88 percent of the proposed SDP limits of work consisting of impervious surfaces. Current on-site elevations range from approximately 25 to 40 feet AMSL, with a distinct grade break extending generally east-west through the site. As a result of this grade break, the northern two-thirds of the property (lower level) exhibit relatively lower elevations, and the southern one-third of the SP area (upper level) is at relatively higher elevations.

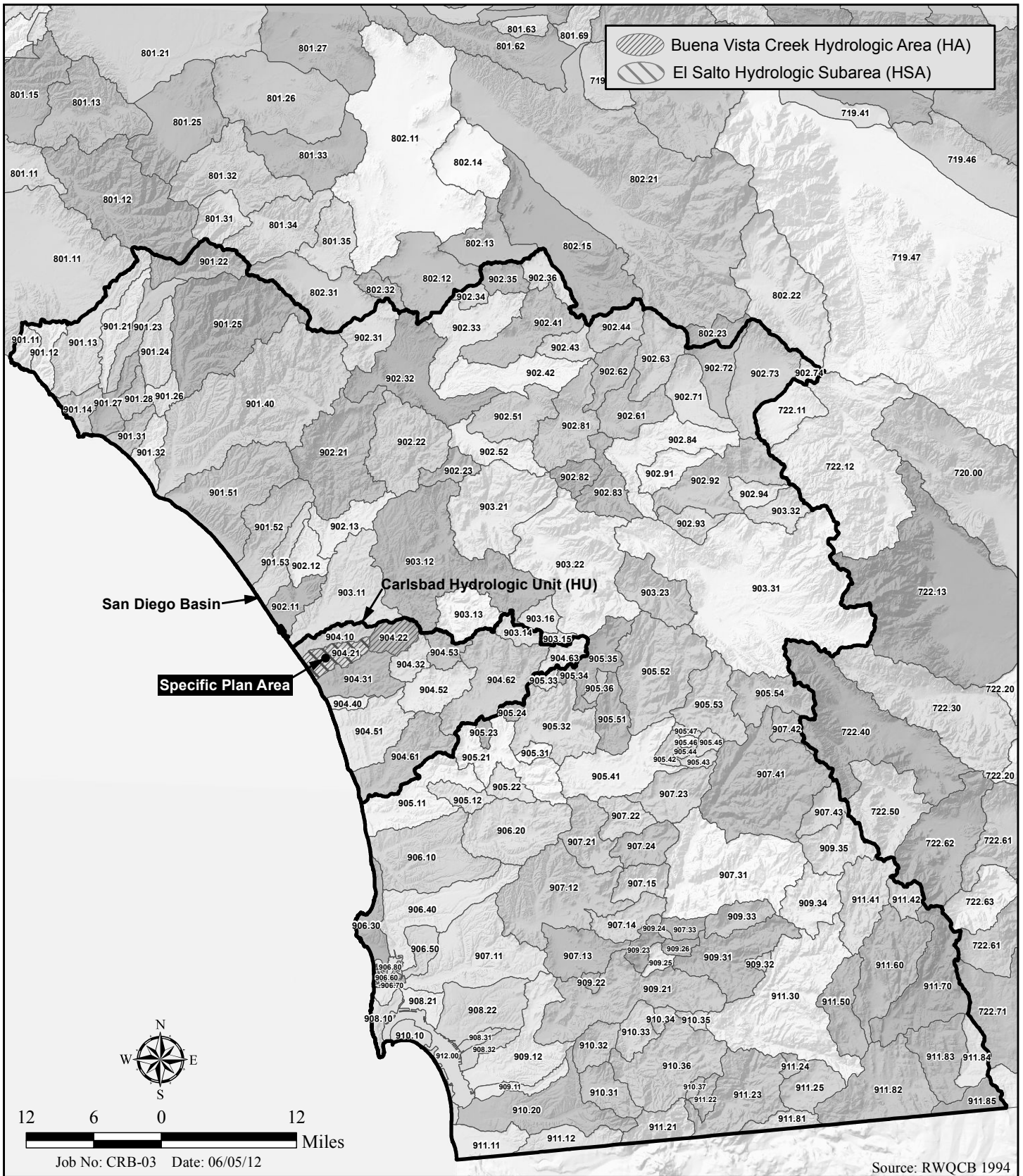
Surface drainage within the SP area is variable in direction, with flows moving generally north and south from the central building complex and entering a series of on-site subsurface storm drain pipelines and related facilities (e.g., inlets) ranging from approximately 12 to 48 inches in diameter (refer to Figure 1 of the Drainage Report in Appendix D). On-site flows moving north enter nearby portions of Buena Vista Creek, which includes a defined channel (floodway) and adjacent areas confined within earthen embankments (floodplain). Drainage of the SP area to the south enters a series of existing storm drain facilities in Marron Road that vary from approximately 15 to 48 inches in diameter. The Marron Road storm drain system continues west and discharges into Buena Vista Creek just west of the SP area. The SP area is within a larger watershed area that incorporates off-site (upstream) properties including commercial and residential development. Accordingly, flows within Buena Vista Creek and the Marron Road storm drain system include drainage from both on- and off-site sources, with the combined flow moving generally west and ultimately entering Buena Vista Lagoon as previously described (refer to Figure 2-2).

Flood Hazards

The SP area and vicinity have been mapped for flood hazards by the Federal Emergency Management Agency (FEMA, 1997). Based on this mapping, the entire SP area is designated as Zone X, or areas determined to be outside the 500- and 100-year floodplains. The closest mapped 100-year floodplain is located along nearby portions of Buena Vista Creek to the north, with this floodplain contained by existing earthen embankments as previously noted.

Groundwater

No regional groundwater basins are mapped within or adjacent to the SP area, with the closest major aquifers located approximately three miles to the north along portions of the San Luis Rey River Valley (California Department of Water Resources [DWR] 2003, San Diego County Water Authority [SDCWA] 1997). The Geotechnical Reconnaissance Report prepared for the proposed project (Appendix C) estimates that shallow groundwater occurs on-site at depths of approximately 13 to 15 feet, and may be influenced by seasonal variation and the presence of water in Buena Vista Creek.



Project Location within Local Hydrologic Designations

WESTFIELD CARLSBAD

Water Quality

Surface Water

Surface water within the SP area consists predominantly of flows from storm events and (to a lesser extent) irrigation runoff. No known surface water quality data are available for the SP area, with storm flows and irrigation runoff subject to variations in water quality due to local conditions such as flow volumes and land use. A summary of typical contaminant sources and loadings for various land use types is provided in Table 4.8-1, *Summary of Typical Contaminant Sources for Urban Storm Water Runoff*, and Table 4.8-2, *Typical Contaminant Loadings in Runoff for Various Land Uses*. Based on the developed nature of the SP area and immediate vicinity, as well as the extent and predominantly urban nature of existing upstream development, surface water quality within the SP area is expected to be generally moderate to poor.

As previously described, the principal surface waters located downstream of the SP area include Buena Vista Creek and Buena Vista Lagoon. Current water quality information for applicable portions of these downstream receiving waters includes quantitative and qualitative data from the following sources: (1) State Surface Water Ambient Monitoring Program (SWAMP) studies for the Carlsbad HU; (2) monitoring associated with the National Pollutant Discharge Elimination System (NPDES); and (3) The State Water Resources Control Board (SWRCB) and RWQCB Section 303(d) list of impaired waters.

Table 4.8-1 SUMMARY OF TYPICAL CONTAMINANT SOURCES FOR URBAN STORM WATER RUNOFF	
Contaminant	Typical Contaminant Sources
Sediment and Floatables	Streets, driveways, landscaping, construction, atmospheric deposition, erosion
Pesticides and Herbicides	Landscaping, roadsides, utility right-of-ways, soil wash-off
Organic Materials	Landscaping, trash collection/disposal areas, animal wastes, streets
Oxygen-demanding Substances	Landscaping, animal wastes, trash collection/disposal areas, leaky sanitary sewer lines or septic systems
Metals	Automobiles, bridges, atmospheric deposition, industrial areas, soil erosion, corroding metal surfaces, combustion processes
Oil and Grease/Hydrocarbons	Roads, driveways, parking lots, vehicle maintenance areas, gas stations, illicit dumping to storm drains
Bacteria and Viruses	Landscaping, roads, leaky sanitary sewer lines or septic systems, sanitary sewer cross-connections, animal wastes
Nitrogen and Phosphorus	Landscaping fertilizers, atmospheric deposition, automobile exhaust, soil erosion, animal wastes, detergents

Source: USEPA 1999

Table 4.8-2
TYPICAL CONTAMINANT LOADINGS IN RUNOFF FOR VARIOUS LAND USES
(pounds/acre/year)

Land Use	TSS	TP	TKN	NH ₃ – N	NO ₂ + NO ₃ – N	BOD	COD	Pb	Zn	Cu
Commercial	1000	1.5	6.7	1.9	3.1	62	420	2.7	2.1	0.4
Parking Lot	400	0.7	5.1	2	2.9	47	270	0.8	0.8	0.04
HDR	420	1	4.2	0.8	2	27	170	0.8	0.7	0.03
MDR	190	0.5	2.5	0.5	1.4	13	72	0.2	0.2	0.14
LDR	10	0.04	0.03	0.02	0.1	N/A	N/A	0.01	0.04	0.01
Freeway	880	0.9	7.9	1.5	4.2	N/A	N/A	4.5	2.1	0.37
Industrial	860	1.3	3.8	0.2	1.3	N/A	N/A	2.4	7.3	0.5
Park	3	0.03	1.5	N/A	0.3	N/A	2	0	N/A	N/A
Construction	6000	80	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Abbreviations Key: HDR = High Density Residential; MDR = Medium Density Residential; LDR = Low Density Residential. N/A = Not available; insufficient data to characterize. TSS = Total suspended solids; TP = Total Phosphorus; TKN = Total Kjeldahl Nitrogen; NH₃ – N = Ammonia – Nitrogen; NO₂ + NO₃ – N = Nitrite + Nitrate Nitrogen; BOD = Biochemical Oxygen Demand; COD = Chemical Oxygen Demand; Pb = Lead; Zn = Zinc; Cu = Copper
Source: USEPA 1999

State Surface Water Ambient Monitoring Program

Monitoring conducted under the SWAMP periodically rotates among watersheds, with the Carlsbad HU most recently monitored in 2002 (SWAMP 2007). This latest effort included water quality data from one monitoring location along Buena Vista Creek just east (upstream) of the SP area. This site was evaluated for water chemistry, water and sediment toxicity, and physical habitat conditions, with the results (as outlined below) suggesting that “[t]he Carlsbad watershed is in poor ecological condition” (SWAMP 2007).

Water Chemistry. Water chemistry testing involved conventional water chemistry (e.g., pH, temperature, and dissolved oxygen), inorganics, pesticides/herbicides, polycyclic aromatic hydrocarbons (PAHs, e.g., byproducts of fossil fuel combustion), dissolved metals, and polychlorinated biphenyls (PCBs). The results of this testing indicate moderate to high impacts to water quality from multiple constituents at the Buena Vista Creek site, based on the following data: (1) aquatic life thresholds were exceeded for 6 physical, inorganic and metal constituents, including ammonia, dissolved selenium, sulfate, dissolved manganese, pH and specific conductivity; (2) PAHs were detected in 2 out of 43 samples; (3) pesticides/herbicides were detected in 19 out of 91 samples; and (4) no PCBs were detected.

Water and Sediment Toxicity. Toxicity testing included evaluating effects from both sediment and water samples to indicator species such as algae and amphipods (shrimp-like crustaceans).

The results of these efforts indicate generally moderate toxicity to tested organisms at the noted site. Specifically, a majority of samples from this site were toxic to at least two (of three total) indicator species.

Physical Habitat. The assessment of physical habitat conditions included criteria such as bank stability, riparian zone width, embeddedness (i.e., the degree to which fine sediments surround coarse substrates on the surface of a streambed) and riffle frequency. Riffles consist of areas with rocky or gravel beds where the current exceeds the average stream velocity, with such areas providing important aquatic habitat. Physical habitat conditions were assessed as generally moderate at the noted site along Buena Vista Creek, with impacts most notable to riparian zone alterations and riffle frequency.

National Pollutant Discharge Elimination System Municipal Permit Monitoring

Historic and current surface water quality monitoring has been/is being conducted within the Buena Vista Creek watershed in association with requirements under the NPDES and related Municipal Storm Water Permit requirements (refer to the discussion of *Regulatory Framework* below for additional information). Specifically, these efforts include wet weather and ambient monitoring along Buena Vista Creek, jurisdictional dry weather monitoring, bioassessment studies, and post-storm event synthetic pyrethroid monitoring as outlined below.

Wet Weather/Ambient Monitoring. Wet weather monitoring was conducted at the Buena Vista Creek Temporary Watershed Assessment Station (TWAS) in the 2007/2008 and 2010/2011 winter seasons, with two storm events monitored during each season. No wet weather monitoring was conducted at the Buena Vista Creek TWAS during the 2008/2009 and 2009/2010 seasons (Weston 2010, 2011). The Buena Vista Creek TWAS is located at El Camino Real, immediately upstream of the SP area. The results of the noted monitoring efforts are summarized as follows:

- 2007/2008 – Regulatory standards were exceeded at: (1) a high frequency for total dissolved solids (TDS), turbidity, total and fecal coliform bacteria, and enterococci bacteria; and (2) a low frequency for conductivity. In addition, persistent toxicity was observed to *Hyalella azteca* (an amphipod species) from synthetic pyrethroids (i.e., pesticides) (Weston Solutions, Inc. [Weston] 2009).
- 2010/2011 – Regulatory standards were exceeded at: (1) a high frequency for TDS and fecal coliform bacteria; (2) a moderate frequency for Bifenthrin (a pyrethroid insecticide); and (3) a low frequency for nutrients and toxicity (Weston 2012).

Ambient Monitoring was also conducted at the Buena Vista Creek TWAS in September and May of the 2007/2008 and 2010/2011 seasons, with the results summarized below. No ambient monitoring was conducted at this TWAS during the 2008/2009 and 2009/2010 seasons (Weston 2010, 2011).

- 2007/2008 – Regulatory standards were exceeded at: (1) a high frequency for TDS and enterococci bacteria; (2) a moderate frequency for total and fecal coliform bacteria; and (3) a low frequency for conductivity (Weston 2009).
- 2010/2011 – Regulatory standards were exceeded at: (1) a high frequency for TDS; (2) a moderate frequency for total nitrogen; and (3) a low frequency for general chemical constituents, bacteriological constituents, and toxicity (Weston 2012).

Jurisdictional Dry Weather Monitoring. Dry weather monitoring was conducted by local jurisdictions between 2007 and 2011 at several up- and downstream locations in the Buena Vista Creek watershed. This program is focused on collecting dry season samples from local storm drain facilities to identify urban pollutants and sources. Associated data indicate that water quality objectives were most commonly exceeded for nitrate, conductivity, turbidity and total coliform bacteria, with bacterial levels generally decreasing over the noted time period (Weston 2009, 2010, 2011, 2012).

Bioassessment Monitoring. Bioassessment monitoring involves evaluation of the taxonomic richness (i.e., number of taxonomic groups) and diversity (i.e., species diversity within taxonomic groups) of benthic macroinvertebrate communities. Bioassessment monitoring was conducted at the Buena Vista Creek TWAS in May of 2008 and 2011, with associated Index of Biotic Integrity (IBI) ratings of very poor (indicating a high probability of poor overall water quality conditions, Weston 2009, 2012). Bioassessment monitoring was not conducted at the Buena Vista Creek TWAS during the period of 2008 through 2010 (Weston 2010, 2011).

Post-storm Event Synthetic Pyrethroid Monitoring. Monitoring for synthetic pyrethroid pesticides was conducted following the first seasonal storm in November 2007, November 2008, and October 2010 at the Buena Vista Creek TWAS (with no monitoring conducted during the 2009/2010 season). The associated sediment samples were tested for toxicity to *H. azteca*, based on a 50-percent mortality rate threshold. The results of these efforts indicated that one tested pyrethroid (Bifenthrin) exceeded the noted mortality threshold in 2007 and 2010. These results are consistent with the previously described 2007/2008 and 2010/2011 wet weather monitoring at the Buena Vista Creek TWAS, which documented toxicity from synthetic pyrethroids

(including Bifenthrin). Synthetic pyrethroid monitoring conducted during the 2008/2009 season indicated that all samples were below their respective detection limits except Bifenthrin, which was detected at a concentration above the minimum detection limit but below the associated reporting limit and 50-percent mortality rate threshold (Weston 2009, 2010, 2012).

303(d) Impaired Water Bodies and Total Maximum Daily Loads

The SWRCB and RWQCB produce bi-annual qualitative assessments of statewide water quality conditions. These assessments are focused on federal Clean Water Act (CWA) Section 303(d) impaired water listings and scheduling for assignment of total maximum daily load (TMDL) requirements. States are required to identify and document any and all polluted surface water bodies, with the resulting documentation referred to as the *Clean Water Act Section 303(d) List of Water Quality Limited Segments*, or more commonly the 303(d) list. This list of water bodies identifies the associated pollutants and TMDLs, along with pollutant sources and projected TMDL implementation schedules. A TMDL establishes the maximum amount of an impairing substance or stressor that a water body can assimilate and still meet water quality standards, and allocates that load among pollution contributors. TMDLs are quantitative tools for implementing the state water quality standards, based on the relationship between pollution sources and local water quality conditions. The 303(d) list is the primary vehicle for protecting water quality in impaired waters bodies and for protecting beneficial uses. The most current (2010) approved 303(d) list identifies downstream receiving waters including Buena Vista Creek and Buena Vista Lagoon, as summarized in Table 4.8-3, *Receiving Water Bodies 303(d) List Summary*.

**Table 4.8-3
RECEIVING WATER BODIES 303(d) LIST SUMMARY**

Water Body Name	Pollutant/Stressor¹	Estimated Size Affected	Proposed TMDL Completion Date
Buena Vista Creek	Sediment Toxicity	11 miles	2019
	Selenium ²	11 miles	2019
Buena Vista Lagoon	Indicator Bacteria	202 acres	2008 ³
	Nutrients ⁴	202 acres	2019
	Sedimentation/Siltation	202 acres	2019

¹ Identified potential pollutant/stressor sources for Buena Vista Creek are unknown; and identified potential pollutant/stressor sources for Buena Vista Lagoon and the Pacific Ocean shoreline are point/nonpoint sources.

² Selenium was added to the 303(d) list of pollutant/stressors for Buena Vista Creek on December 16, 2009 in the *2008 Clean Water Act Sections 305(b) and 303(d) Integrated Report on Evaluation of Surface Water Quality and Listing of Impaired Water Body Segments for the San Diego Region*.

³ TMDLs not established to date.

⁴ Estimated impairment area includes 150 acres in the upper portion of the lagoon.
Source: SWRCB 2010, 2009

Groundwater

No known groundwater quality data are available for the SP area or vicinity. Based on the generally urban nature of on-site and surrounding development, the surface water quality data discussed above, and the RWQCB water quality objectives identified for local groundwater below under *Regulatory Framework*, local groundwater quality is anticipated to be generally poor.

Water Quality Summary

Existing surface and groundwater quality within the SP area and vicinity is assumed to be generally moderate to poor. This conclusion is based on the noted surface water monitoring data, the largely urban nature of local watersheds, local receiving water 303(d) listings, and the groundwater quality objectives identified below under *Regulatory Framework*.

Regulatory Framework

The proposed project is subject to a number of federal, state and local regulatory requirements related to potential hydrologic and water quality issues. Specifically, these requirements include applicable elements of the federal CWA and NPDES, RWQCB Basin Plan, and City standards as summarized below.

Clean Water Act/National Pollutant Discharge Elimination System Standards

Specific CWA/NPDES requirements applicable to the project include the following: (1) the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit, NPDES No. CAS000002); (2) the General Groundwater Extraction Waste Discharge Permit For Discharge To Surface Waters in the San Diego Region Except For San Diego Bay (Groundwater Permit, NPDES No. CAG919002); and (3) the NPDES Municipal Permit (Municipal Permit, NPDES No. CAS0108758).

General Construction Activity Permit

Conformance with the Construction General Permit is required prior to development of applicable sites exceeding one acre, pursuant to SWRCB Order 2009-0009-DWQ. Specific conformance requirements include implementing a Storm Water Pollution Prevention Plan (SWPPP), an associated Construction Site Monitoring Program (CSMP), employee training, and minimum best management practices (BMPs), as well as a Rain Event Action Plan (REAP) for

applicable projects (e.g., those in Risk Categories 2 or 3, as outlined below). Under the Construction General Permit, project sites are designated as Risk Level 1 through 3 based on site-specific criteria (e.g., sediment and receiving water risk), with Risk Level 3 sites requiring the most stringent controls. Based on the site-specific risk level designation, the SWPPP and related plans/efforts identify detailed measures to prevent and control the off-site discharge of pollutants in storm water runoff. Depending on the risk level, these may include mandatory technology-based action levels, effluent limitations, and active treatment systems (ATS). Specific pollution control measures require the use of best available technology (BAT) and/or best conventional pollutant control technology (BCT) levels of treatment, with these requirements implemented through applicable BMPs. While site-specific measures vary with conditions such as risk level, proposed grading, and slope/soil characteristics, detailed guidance for construction-related BMPs is provided in the permit and the related City Storm Water Standards Manual (City of Carlsbad 2004a, refer to the discussion of City Standards below for additional information). Additional sources for general construction-related BMPs that may be applicable to the project include the Storm Water Best Management Practices Handbooks (California Stormwater Quality Association [CASQA] 2009) and the EPA Nationwide Menu of Best Management Practices for Storm Water Phase II (USEPA 2010c).

General Groundwater Extraction Waste Discharge Permit

Conformance with the noted Groundwater Permit is required by the RWQCB prior to disposal of extracted groundwater, pursuant to Order No. R9-2008-0002 for the SP area. This requirement is generally applicable to all groundwater discharge regardless of volume, with certain exceptions as noted in the permit text. Specific requirements for permit conformance include: (1) implementing an appropriate sampling and analysis/monitoring program; (2) providing at least 30 days notification to the appropriate local agency prior to discharging to a municipal storm drain system; (3) conforming with applicable water quality standards, including (but not limited to) the Basin Plan, CWA, and State Porter-Cologne Water Quality Control Act; and (4) submittal of applicable monitoring reports.

Municipal Storm Water Permit

The Municipal Permit (RWQCB Order No. R9-2007-0001) is intended to protect environmentally sensitive areas and provide conformance with pertinent hydrology and water quality standards. Associated requirements involve using applicable planning, design, operation, treatment, and enforcement measures to maintain predevelopment runoff volume and velocity

levels to the maximum extent practicable (MEP), avoid/address potential hydromodification¹ impacts, and reduce pollutant discharges to the MEP. Specifically, these measures include: (1) using jurisdictional controls to regulate flows and protect water quality; (2) requiring coordination between individual jurisdictions to provide watershed-based hydrology/water quality protection; (3) implementing applicable site design/low impact development (LID), source control, priority project, and/or treatment control BMPs to avoid, reduce, and/or mitigate effects including increased erosion and sedimentation, hydromodification, and the discharge of contaminants in urban runoff; and (4) using appropriate monitoring, reporting, and enforcement efforts to ensure proper implementation, documentation, and (as appropriate) modification of permit requirements.

The Municipal Permit also requires co-permittees (e.g., the City) to fund and implement Urban Runoff Management Plans (URMPs) to reduce runoff and contaminant discharges to the MEP. The URMPs include both jurisdictional (JURMPs) and watershed-based efforts (WURMPs). The City JURMP was updated in 2008 to reflect the current NPDES Municipal Permit, and identifies urban runoff regulatory requirements for the planning, construction, and operation of public and private development in the City. The watershed-based approach has been implemented in the SP area watershed through the Carlsbad WURMP (City of Carlsbad, et al. 2008). The WURMP is similar in intent to the JURMP, but encompasses multiple jurisdictions and related coordination efforts within the Carlsbad watershed. Pursuant to the described Municipal Permit requirements, the City has also participated in developing the Standard Urban Storm Water Mitigation Plan (SUSMP), prepared a local SUSMP, and adopted related storm water standards and ordinances as described below under the City Standards discussion.

Basin Plan Standards

The San Diego Basin Plan (RWQCB 1994) establishes beneficial uses and water quality objectives for surface and groundwater resources. Beneficial uses are defined in the Basin Plan as “the uses of water necessary for the survival or well being of man, plus plants and wildlife.” Water quality objectives are identified as “the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses.” Existing and potential beneficial uses for applicable inland surface, coastal, and groundwater resources within the El Salto HSA are summarized below.

- Buena Vista Creek (Hydrologic Unit 904.21). Existing beneficial uses include agricultural supply (AGR); industrial service supply (IND); contact recreation (REC-1); non-contact

¹ Hydromodification is defined in the Municipal Permit as the change in natural watershed hydrologic processes and runoff characteristics (infiltration and overland flow) caused by urbanization or other land use changes that result in increased stream flows, sediment transport, and morphological changes in the channels receiving the runoff.

recreation (REC-2); warm freshwater habitat (WARM); and rare, threatened and endangered species (RARE). No potential beneficial uses are listed for Buena Vista Creek.

- Buena Vista Lagoon (Hydrologic Unit 904.21). Existing beneficial uses include REC-1, REC-2, biological habitats of special significance (BIOL), wildlife habitat (WILD), RARE, marine habitat (MAR), and WARM, with potential beneficial uses limited to estuarine habitat (EST).
- Pacific Ocean. Existing beneficial uses include IND; navigation (NAV); REC-1; REC-2; commercial and sport fishing (COMM); BIOL; WILD; RARE; MAR; aquaculture (AQUA); migration of aquatic organisms (MIGR); spawning, reproduction and/or early development (SPWN); and shellfish harvesting (SHELL). No potential beneficial uses are listed for the Pacific Ocean.
- Groundwater (Hydrologic Unit 904.21). Existing beneficial uses include municipal and domestic supply (MUN) and AGR, with potential beneficial uses limited to IND.

Water quality objectives include both narrative requirements (which can encompass qualitative and quantitative standards) and specific numeric objectives for applicable constituents. Identified numeric water quality objectives for the Buena Vista Creek HA (surface water) and El Salto HSA (groundwater) are summarized below in Table 4.8-4, *Surface and Groundwater Quality Objectives for the Buena Vista Creek Hydrologic Area and the El Salto Hydrologic Subarea*. Basin Plan beneficial uses and water quality objectives are used (along with other data) to identify the Section 303(d) impaired water segments and related TMDL requirements.

Table 4.8-4 SURFACE AND GROUNDWATER QUALITY OBJECTIVES FOR THE BUENA VISTA CREEK HYDROLOGIC AREA AND THE EL SALTO HYDROLOGIC SUBAREA¹												
SURFACE WATER												
Buena Vista Creek Hydrologic Area												
Constituent (mg/l or as noted)												
TDS	Cl	SO₄	% Na	N&P	Fe	Mn	MBAS	B	Odor	Turb (NTU)	Color Units	F
500	250	250	60	-- ²	0.3	0.05	0.5	0.75	None	20	20	1.0

Table 4.8-4 (cont.)
SURFACE AND GROUNDWATER QUALITY OBJECTIVES FOR THE
BUENA VISTA CREEK HYDROLOGIC AREA AND THE EL SALTO
HYDROLOGIC SUBAREA¹

GROUNDWATER												
El Salto Hydrologic Subarea³												
Constituent (mg/l or as noted)												
TDS	Cl	SO₄	% Na	NO₃	Fe	Mn	MBAS	B	Odor	Turb (NTU)	Color Units	F
3,500	800	500	60	45	0.3	0.05	0.5	2.0	None	5	15	1.0

¹ Concentrations not to be exceeded more than 10% of the time during any one-year period; refer to Figure 4.8-1 for hydrologic designation locations.

² Shall be maintained at levels below those which stimulate algae and emergent plant growth.

³ Standards do not apply west of the eastern boundary of Interstate 5.

Abbreviation Key: TDS = total dissolved solids; Cl = Chlorides; SO₄ = Sulfate; Na = Sodium; N&P = Nitrogen and Phosphorus; NO₃ = Nitrate; Fe = Iron; Mn = Manganese; MBAS = Methylene Blue Activated Substances (e.g., commercial detergent); B = Boron; Turb = Turbidity (measured in Nephelometric Turbidity Units [NTU]); F = Fluoride.

Source: RWQCB 1994

City of Carlsbad Standards

Pursuant to the NPDES and associated requirements described above, the City has adopted a number of ordinances and regulatory requirements related to drainage and water quality, including the following: (1) the Grading Ordinance (Carlsbad Code of Ordinances, Title 15, Chapter 15.16); (2) the Storm Water Management and Discharge Control Ordinance (Carlsbad Code of Ordinances, Title 15, Chapter 15.12); (3) Engineering Standards Volume 4, Storm Water Standards Manual, Chapters 1 through 4 (City of Carlsbad 2004a, as amended); and (4) Engineering Standards Volume 1, General Design Standards.

Grading Ordinance

The City Grading Ordinance establishes minimum requirements for development-related grading through the issuance of grading permits, with the intent of maximizing safety and protecting environmental resources to the MEP. With respect to drainage and water quality concerns, the Grading Ordinance requires that applicable grading permits include a construction SWPPP that is consistent with City Storm Water Standards and approved by the City Engineer. Specific requirements associated with the SWPPP include the installation and maintenance of drainage and erosion control measures to protect downstream properties and habitats from flooding, sedimentation, increased runoff, and other adverse impacts related to grading and construction activity.

Storm Water Management and Discharge Control Ordinance

The Storm Water Management and Discharge Control Ordinance is intended to protect the public and environmental health and welfare by: (1) prohibiting non-storm water discharges and eliminating illicit discharges to the storm drain system; and (2) reducing pollutant discharges to the MEP in conformance with applicable water quality objectives. The ordinance provides specific direction to achieve these requirements, including identification of prohibited discharges (e.g., wash water, food-related wastes, chlorinated pool water, and discharges containing hydrocarbons or other hazardous substances), requirements to prepare project-specific SWMPs, and procedures for inspection/enforcement, spill response, and mitigation/monitoring.

Storm Water Standards Manual

The City Storm Water Standards Manual (Manual) is intended to provide conformance with current NPDES and related requirements, including applicable elements of the NPDES Municipal Permit and Construction General Permit, the Countywide Model SUSMP, and the Final Hydromodification Management Plan for San Diego County (County of San Diego 2011a). The Manual includes the current (2011) City SUSMP (Chapter 2), which provides specific direction for preparing SWMPs; determining anticipated pollutants; identifying appropriate LID site design, source control, priority project, and structural treatment BMPs; and addressing hydromodification requirements in conformance with NPDES standards. The Manual also provides direction for complying with the NPDES Construction General Permit and related standards and requirements (Chapter 3), through efforts such as the preparation of SWPPPs.

General Design Standards

The General Design Standards (City of Carlsbad 2004b) include requirements related to drainage and storm drain standards (Volume 1, Chapter 5); grading and drainage (Volume 1, Chapter 7); and LID standards (Volume 4, Chapter 2). Specifically, the drainage and storm drain standards provide direction for the design, capacity, and operation of drainage facilities/systems, including hydraulic, capacity, and discharge specifications. The grading, drainage, and LID standards include requirements for soils reports, SWMPs, manufactured slope design/stabilization, drainage system design, and the use of LID measures to reduce runoff by mimicking the existing natural hydrologic conditions.

4.8.2 Thresholds for Determining Significance

Appendix G of the State CEQA Guidelines provides direction for determining the significance of potential project-related impacts associated with hydrology and water quality issues. Based on these guidelines and other applicable criteria, a significant impact would occur if the proposed project would:

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site, or that would substantially increase the rate or amount of surface runoff and result in flooding or hydromodification either on or off site;
- Create or contribute runoff that would exceed the capacity of existing or planned storm drain systems, or that would provide substantial additional sources of polluted runoff;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, such that there would be a net deficit in aquifer volume or a lowering of local groundwater tables;
- Place structures or facilities within a mapped 100-year floodplain in a manner that would result in on- or off-site flood hazards, or that would impede or redirect flood waters;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam;
- Potentially degrade the water quality of any impaired water course or water body, as listed on the CWA Section 303(d) list, and contribute additional pollutants for which the receiving water body is already listed; or
- Not conform to applicable Federal, State or local statutes and regulations related to surface or groundwater quality, including but not limited to, the Federal CWA, California Porter-Cologne Water Quality Control Act, NPDES, and the City of Carlsbad Storm Water Standards Manual and Code of Ordinances.

4.8.3 Environmental Impact

Drainage Alteration

As described above in Section 4.8.1, surface drainage within the SP area is variable in direction, with runoff generally moving north and south and conveyed to Buena Vista Creek and Lagoon via existing storm drain facilities. Project implementation would involve demolition, grading, excavation, and construction activities to accommodate the proposed SDP, with some associated minor alteration of on-site drainage patterns (e.g., from new or modified structures, pavement, and landscaping). These modifications would be predominantly temporary (construction-related) and/or minor in nature, with the overall existing drainage patterns and directions to remain essentially unchanged. Specifically, all post-development flow from the SP area would continue to enter Buena Vista Creek and Lagoon via existing and/or modified storm drain facilities within the site and along Marron Road. Based on the described retention of the principal on- and off-site drainage characteristics, project implementation would not substantially alter on- or off-site drainage patterns/directions, generate substantial on- or off-site erosion/siltation related to the project, or result in substantial changes to runoff rates/amounts and associated flooding hazards. Accordingly, no significant impacts related to drainage alteration would result from implementation of the current SDP proposal (with additional discussion of potential effects associated with runoff rates/amounts and erosion/sedimentation provided below in this section).

Runoff Rates/Amounts

As previously noted, the limits of work for the current SDP proposal (i.e., the limits of proposed construction and development activities) includes approximately 18.03 acres, with 15.91 acres (88 percent) of this area encompassing impervious surfaces such as structures and pavement. Project implementation would result in a net decrease of impervious surfaces, due to the proposed installation of large swaths of pervious pavement, vegetated swales and enhanced landscaping (with additional information provided below under the discussion of water quality). Specifically, impervious surfaces within the noted 18.03-acre revitalization area would be reduced from 15.91 to 13.33 acres (88 to 74 percent), with a corresponding reduction in on-site runoff rates and amounts. Based on these conditions, implementation of the proposed project would not result in any significant impacts related to increases in the rate or amount of runoff within or from the site.

The proposed project would also conform to applicable requirements under the previously referenced Final Hydromodification Management Plan for San Diego County. Specifically, the

proposed project would result in a net reduction of runoff rates and amounts from the SDP area, and would therefore not generate any significant impacts related to hydromodification.

Storm Drain Capacity/Additional Sources of Polluted Runoff

As previously described, the proposed project would not result in an increase in the rate or amount of runoff within or from the site. Accordingly, the project Drainage Report concludes that “[t]he inlet capacities of the storm drain system are sufficient to convey runoff from a 100-year storm event...” and “...100-year runoff generated from the proposed development will not adversely impact the downstream facilities any more than what has previously been constructed.” Based on these considerations, no significant impacts related to the capacity of on- or off-site storm drain facilities or the generation of additional sources of polluted runoff would occur from project implementation (with additional discussion of potential pollution generation from the proposed project provided below in this section).

Groundwater

The proposed project would not involve the extraction of groundwater for purposes such as consumption or irrigation, and no associated impacts to aquifer levels or recharge capacity would occur. Implementation of the current SPD proposal would entail a net reduction of on-site impervious surfaces as previously described, with a corresponding increase in infiltration and recharge capacity. As noted above in Section 4.8.1, shallow groundwater is anticipated to occur on site, and may require extraction and disposal to accommodate proposed development. Based on the temporary nature of potential construction dewatering and the fact that associated discharge would likely be within local groundwater recharge areas (e.g., Buena Vista Creek), no significant impacts related to issues such as aquifer drawdown or depletion are anticipated. Construction dewatering, if required, would also be subject to applicable NPDES requirements related to water quality concerns, with these requirements described below in this section.

Floodplains/Flooding

As described under *Existing Conditions*, the SP area is not located within any mapped 100-year floodplain boundaries. Accordingly, no associated potential impacts related to flood hazards or the potential to impede or redirect flood waters would result from implementation of the current SDP proposal.

Water Quality

Potential project-related water quality impacts are associated with both short-term construction activities and long-term operation and maintenance. Project-related activities would not result in any direct effects to groundwater quality through activities such as underground storage of hazardous materials (e.g., fuels). Accordingly, potential impacts to groundwater quality would be limited to the normal percolation of surface runoff containing urban contaminants generated within the SP area, and would be less than significant. Specifically, as described below in this section, surface flows within the site would either be treated via vegetated swales or trench drain filter inserts before being discharged into the storm drain system, or would be infiltrated through pervious pavement. Such infiltration provides water quality treatment for percolating runoff before it reaches the groundwater table, with pervious pavement recognized as an effective treatment BMP. As a result, all surface runoff within and from the site would be treated before potentially reaching local aquifers, and would not contribute to potential groundwater quality degradation. The project SWMP (Appendix D) provides details of how the proposed pervious pavement would be periodically cleaned and maintained to keep it in good working order. Based on the above discussion, the following assessment of potential water quality impacts is applicable to both surface and groundwater resources.

Construction Impacts

Potential water quality impacts related to project construction include erosion/siltation (sedimentation), the on-site use and storage of construction-related hazardous materials (e.g., fuels, etc.), generation of debris from demolition activities, and disposal of extracted groundwater (if required), as described below.

Erosion and Sedimentation

Proposed excavation, grading, and construction activities associated with the current SDP proposal could potentially result in related erosion and off-site sediment transport (sedimentation). Project activities would involve the temporary removal of surface stabilizing features such as pavement, excavation of existing compacted materials from cut areas, redeposition of excavated (and/or imported) material as fill in proposed development sites, potential sediment generation from paving activities, and potential erosion from disposal of extracted groundwater (if required). Project-related erosion could result in the influx of sediment into downstream receiving waters impaired for sediment toxicity and sedimentation on the CWA 303(d) list (i.e., Buena Vista Creek and Lagoon, respectively, refer to Table 4.8-3). The

potential project-related discharge of sediment into downstream receiving waters could potentially result in significant water quality impacts such as increased turbidity and related effects to aquatic habitats and species, as well as the transport of other contaminants that tend to adhere to sediment particles.

While graded, excavated, and filled areas associated with current SDP construction activities would ultimately be stabilized through efforts such as compaction and installation of hardscape and landscaping, erosion potential would be higher in the short-term than for existing conditions. Developed areas would be especially susceptible to erosion between the beginning of grading/construction and the installation of pavement or establishment of permanent cover in landscaped areas. Accordingly, water quality impacts associated with short-term erosion and sedimentation resulting from current SDP construction activities are considered potentially significant. Short-term erosion and sedimentation impacts would be addressed through conformance with the NPDES Construction General Permit and City Storm Water Standards Manual, including the implementation of an authorized SWPPP to address (among other issues) erosion and sedimentation concerns. While specific BMPs related to this issue would be determined during the SWPPP process based on site characteristics (soils, slopes, etc.) and proposed grading, they would likely include standard industry measures and guidelines contained in the Construction Permit text and related regulatory and industry guidelines identified above under *Regulatory Framework*. Typical erosion and sediment control measures that would likely be implemented as part of the project SWPPP are summarized in Section 4.8.4, *Mitigation Measures*.

Construction-related Hazardous Materials

Project construction would involve the on-site use and/or storage of hazardous materials such as fuels, lubricants, solvents, concrete, paint, and portable septic system wastes. The accidental discharge of such materials during construction could potentially result in significant impacts if such materials reach downstream receiving waters, particularly materials such as petroleum compounds that can be toxic to aquatic species in low concentrations. Implementation of a SWPPP would be required under NPDES and City guidelines as noted above for erosion and sedimentation, and would include detailed measures to avoid or mitigate potential impacts related to the use and potential discharge of construction-related hazardous materials. While detailed BMPs would be determined as part of the NPDES/SWPPP process based on site-specific parameters, they are likely to include standard measures from the Construction General Permit text and the related City Storm Water Manual, as well as the additional regulatory/industry sources referenced under *Regulatory Framework*. Typical measures

associated with construction-related hazardous materials that would likely be implemented as part of the project SWPPP are summarized in Section 4.8.4.

Demolition-related Debris Generation

Project construction would involve the demolition of existing facilities including structures and pavement. These activities would generate variable amounts of construction debris, potentially including concrete, asphalt, glass, metal, drywall, paint, insulation, fabric, wood, and other materials. Proposed demolition activities could also potentially generate dust and particulates (e.g., dust from structure razing or pavement demolition), as well as contaminants related to hazardous materials including lead-based paint and asbestos insulation. The introduction of demolition-related particulates or hazardous material contaminants into the local storm drain system could potentially result in significant downstream water quality impacts. Project construction would be subject to a number of regulatory controls related to demolition, including the NPDES/SWPPP requirements and related City Storm Water Standards described above. The project SWPPP would include measures to address potential effects associated with contaminant generation from demolition activities, with detailed requirements to be determined as part of the SWPPP process. A number of standard BMPs would likely be applicable, however, with these measures summarized in Section 4.8.4.

Disposal of Extracted Groundwater

As previously described, project-related excavation and construction could potentially result in requirements for the extraction and disposal of groundwater to facilitate proposed development. Disposal of groundwater extracted during construction activities into local drainages and/or storm drain facilities could potentially generate significant water quality impacts through erosion/sedimentation (e.g., if discharged onto graded areas or slopes), or the possible occurrence of contaminants in local groundwater aquifers. Project construction would require conformance with applicable NPDES Groundwater Permit criteria prior to disposal of extracted groundwater (as outlined under *Regulatory Framework*). While specific BMPs to address potential water quality concerns from disposal of extracted groundwater would be determined based on site-specific parameters, they would likely include the use of erosion prevention and sediment control devices similar to those described above, as well as standard measures from the Groundwater Permit text. Typical measures associated with construction-related groundwater extraction and disposal that would likely be implemented for the proposed project are summarized in Section 4.8.4.

Operation and Maintenance Impacts

Potential long-term water quality impacts from the proposed project are related to the generation of contaminants from facility operation and maintenance. Erosion and sedimentation are not considered to be significant long-term concerns for the proposed project, as developed areas would be stabilized through installation of hardscape or landscaping. The project also would incorporate long-term water quality controls pursuant to NPDES and related City guidelines, including measures that would avoid or reduce off-site sediment transport. Specifically, this would include efforts such as the use of vegetated swales, pervious pavement, irrigation controls, and drainage facility maintenance (i.e., to remove accumulated sediment).

The project SWMP (Hofman 2012d in Appendix D) identifies pollutants of concern and proposed control measures related to project development, based on procedures identified in the NPDES Municipal Permit and related City standards. The proposed project is identified as a “Significant Redevelopment” under City guidelines, due to the disturbance of more than one acre of land and its classification as a “pollutant-generating redevelopment project.” The proposed project is also identified as a “Priority Project” under NPDES guidelines, due to the inclusion of proposed development categories such as commercial development, parking areas, and potential new restaurants. Anticipated and potential contaminants associated with the proposed project include sediment, nutrients, heavy metals, organic compounds, trash and debris, oxygen demanding substances, oil and grease, bacteria and viruses, and pesticides (Hofman 2012d in Appendix D). Urban contaminants accumulate in areas such as parking areas and drainage facilities, and are picked up in runoff during storm events. Long-term operation and maintenance of the proposed project would generate potential contaminant loading in on- and off-site runoff, and could result in the on- and off-site transport of urban contaminants and associated significant effects such as increased turbidity, oxygen depletion, and toxicity to attendant species in downstream receiving waters. Affected downstream waters may include portions of Buena Vista Creek and Buena Vista Lagoon, both of which are included on the current (2010) list of CWA Section 303(d) impaired waters (refer to Table 4.8-3), and the Pacific Ocean.

The proposed project would be required to conform to applicable NPDES and City storm water standards, with such conformance to include the use of appropriate post-construction site design/LID, source control, priority project, and treatment control BMPs. Specific proposed BMPs are identified in the project SWMP (Hofman 2012d in Appendix D), with these measures summarized below in Section 4.8.4.

4.8.4 Mitigation Measures

Per the discussions in Section 4.8.3, implementation of the proposed project would result in potentially significant water quality impacts related to short-term construction activities and long-term operation and maintenance of the proposed development. A number of associated mitigation measures are outlined below, based on applicable regulatory requirements of the NPDES and related City standards. No potentially significant impacts were identified for issues including drainage alteration, runoff rates/amounts, hydromodification, storm drain capacity, groundwater, or floodplains/flooding, with associated mitigation therefore not required.

WQ-1 Prior to issuance of a project grading permit, a SWPPP shall be submitted to the City Engineer for review and approval. The project SWPPP shall include adequate BMPs, to the satisfaction of the City Engineer, to demonstrate conformance with the NPDES Construction General Permit (Order No. 2009-0009-DWQ) and related City requirements for the issues of erosion/sedimentation, construction-related hazardous materials, and demolition-related debris generation. While final BMPs would be determined as part of the noted SWPPP process based on site-specific parameters, they would likely include standard measures from the NPDES Permit text and City Storm Water Standards, as outlined below.

Erosion/Sedimentation

- Use phased grading schedules to limit the area subject to erosion at any given time.
- Prepare and implement a CSMP to ensure appropriate monitoring, testing, BMP effectiveness, and conformance with applicable discharge requirements.
- Prepare and implement a REAP, if applicable (i.e., depending on risk level), to ensure that active construction areas/activities have adequate erosion and sediment controls in place within 48 hours of the onset of any likely precipitation event (i.e., 50 percent or greater probability of producing precipitation, per National Oceanic and Atmospheric Administration projections).
- Properly manage storm water and non-storm water flows to minimize runoff.
- Use erosion control/stabilizing measures such as geotextiles, mulching, mats, plastic sheets/tarps, fiber rolls, soil binders, compost blankets, soil roughening, or temporary hydroseeding (or other plantings) in appropriate areas (e.g., graded areas).

- Use appropriate sediment controls to protect the construction site perimeter and prevent off-site sediment transport, potentially including measures such as temporary inlet filters, silt fences, fiber rolls, silt dikes, biofilter bags, gravel bags, compost socks/berms, temporary sediment basins, check dams, street sweeping/vacuuming, ATS, energy dissipators, stabilized construction access points/sediment stockpiles, and properly fitted covers for sediment transport vehicles.
- Store BMP materials on-site to provide “standby” capacity adequate for the complete protection of exposed areas and to prevent off-site sediment transport.
- Provide full erosion control for disturbed areas not actively worked for seven (7) or more consecutive calendar days during the rainy season (October 1 to April 30), or 14 or more consecutive calendar days during the non-rainy season.
- Provide appropriate training for personnel responsible for BMP installation and maintenance.
- Use solid waste management efforts such as street sweeping, and proper containment and disposal of construction debris.
- Comply with local dust control requirements.
- Install permanent landscaping, with emphasis on native and/or drought-tolerant varieties, as soon as feasible during or after construction.
- Implement appropriate monitoring and maintenance efforts (e.g., prior to, during and after storm events) to ensure proper BMP function and efficiency.
- Implement sampling/analysis, monitoring/reporting and post-construction management programs per NPDES and/or City requirements.
- Restrict paving operations during wet weather and use sediment control devices downstream of paving activities.
- Implement additional BMPs as necessary to ensure adequate erosion and sediment control.

Construction-related Hazardous Materials

- Minimize the amount of hazardous materials on-site, and restrict storage/use locations to areas at least 50 feet from storm drains and surface waters.
- Use raised (e.g., on pallets), covered, and/or enclosed storage facilities for all hazardous materials, and maintain accurate and up-to-date written inventories and labels.
- Use berms, ditches, and/or impervious liners (or other applicable methods) in material storage and vehicle/equipment maintenance and fueling areas to provide a containment volume of 1.5 times the volume of stored/used materials and prevent discharge in the event of a spill.
- Place warning signs in areas of hazardous material use or storage and near storm drains (or other appropriate locations) to avoid inadvertent disposal.
- Properly maintain all construction equipment and vehicles.
- Properly contain and dispose of wastes and/or slurry from sources including concrete, finishing compounds, dry wall, and paint, by using methods such as providing properly designed and contained washout areas, avoiding overuse, and protecting storm drain inlets.
- Use appropriate measure to control non-storm water wastes, such as containment and treatment.
- Provide training for applicable employees in the proper use, handling, and disposal of hazardous materials, as well as appropriate action to take in the event of a spill.
- Store absorbent and clean-up materials in readily accessible locations.
- Properly locate, maintain, and contain wastewater facilities.
- Use recycled or less hazardous materials wherever feasible.

- Post regulatory agency telephone numbers and a summary guide of clean-up procedures in a conspicuous location.
- Regularly (at least weekly) monitor and maintain hazardous material use/storage facilities and operations to ensure proper working order.
- Restrict construction debris storage areas to appropriate locations at least 50 feet from storm drain inlets and water courses.
- Use appropriate storage facilities for construction debris, including adequately sized watertight dumpsters, covers to preclude rain from contacting waste materials, impervious liners, and surface containment features such as berms, dikes or ditches to prevent run-on and runoff.
- Employ a licensed waste disposal operator to regularly (at least once a week) remove and dispose of construction debris at an authorized off-site location.

Demolition-related Debris Generation

- Recycle appropriate (i.e., non-hazardous) construction debris for on- or off-site use whenever feasible.
- Restrict construction debris storage areas to appropriate locations at least 50 feet from storm drain inlets.
- Use appropriate storage facilities for applicable construction debris, including adequately sized watertight dumpsters, covers to preclude rain from contacting waste materials, impervious liners and surface containment features such as berms, dikes or ditches to prevent run-on, runoff and infiltration.
- Employ a licensed waste disposal operator to regularly remove and dispose of construction debris in an authorized off-site location.
- Implement appropriate controls for concrete sawing or grinding activities, such as slurry and debris containment.
- Use dust-control measures such as watering to reduce particulate generation for pertinent locations/activities (e.g., concrete removal).

- Use appropriate erosion and sediment control measures downstream of all demolition activities.
- Conform to applicable requirements related to the removal, handling, transport, and disposal of hazardous materials generated during demolition, including efforts such as implementing appropriate sampling and monitoring procedures; proper containment of contaminated materials during construction; providing protective gear for workers handling hazardous materials; ensuring acceptable exposure levels; and ensuring safe and appropriate handling, transport, and disposal of hazardous materials generated during project construction.

WQ-2 The extraction and disposal of groundwater associated with project construction activities shall conform to all applicable requirements of the NPDES Groundwater Permit (R9-2008-0002). While final BMPs would be determined as part of the NPDES Permit process based on site-specific parameters, they would likely include standard measures from the NPDES Permit text, with typical requirements outlined below.

- Use erosion/sedimentation controls similar to those described above in Mitigation Measure WQ-1.
- Test extracted groundwater for appropriate contaminants prior to discharge.
- Treat extracted groundwater prior to discharge, if required, to provide conformance with applicable discharge criteria (e.g., through methods such as filtration, aeration, adsorption, disinfection, and/or conveyance to a municipal wastewater treatment plant).

WQ-3 Long-term project operation and maintenance shall conform to all applicable requirements of the NPDES Municipal Permit (Order No. R9-2007-0001) and related City standards, including the Grading Ordinance (Carlsbad Code of Ordinances, Title 15, Chapter 15.16); the Storm Water Management and Discharge Control Ordinance (Carlsbad Code of Ordinances, Title 15, Chapter 15.12); Engineering Standards Volume 4, Storm Water Standards Manual; and Engineering Standards Volume 1, General Design Standards. The project SWMP (Hofman 2012d) has identified a number of LID site design, source control, priority project, and treatment control BMPs to provide conformance to the noted requirements (with preliminary BMP locations included on the Drainage Management Areas graphic in the SWMP in Appendix D). These measures and

associated maintenance efforts are summarized below and shall be implemented to the satisfaction of the City Engineer.

LID Site Design BMPs – LID site design BMPs are intended to control post-development runoff, erosion potential, and contaminant generation by mimicking the natural hydrologic regime to the MEP, and capturing, filtering, storing, evaporating, detaining, and/or infiltrating runoff close to its source. Specific LID site design BMPs identified in the project SWMP include the following:

- Limit the extent of impervious surfaces to the MEP by maximizing building density with a multi-story design (per City build height limitations), designing buildings and circulation facilities to minimize roof and pavement areas, and maintaining associated access roads and parking lots at the minimum allowable width of 24 feet.
- Preserve existing vegetation wherever feasible; maximize the use of native and/or drought-tolerant landscaping; use pervious surfaces (turf, gravel or pervious pavement) wherever feasible; and direct site drainage from parking areas and rooftops into pervious areas, (e.g., vegetated swales and pervious pavement) to the MEP.
- Drain impervious areas (parking lots and rooftops) to engineered treatment control BMPs or Integrated Management Practices (IMPs).

The described LID site design BMPs would help reduce long-term contaminant generation by retaining pervious areas and limiting increases in site runoff rates/amounts, increasing filtering and infiltration potential, and minimizing chemical applications (i.e., pesticides, herbicides and fertilizers).

Source Control BMPs - Source control BMPs are intended to avoid or minimize the introduction of contaminants into storm drains and natural drainages by reducing on-site contaminant generation and off-site contaminant transport to the MEP. Specific source control BMPs identified in the project SWMP include the following:

- Design trash storage area to include impervious (concrete) bases, slopes to prevent run-on/runoff to/from adjacent areas; walls and gates to prevent trash dispersal; and covers and attached receptacle lids to minimize direct precipitation contact.

- Employ efficient irrigation systems consistent with the City Landscape Manual to reduce/control associated flows and runoff, including measures such as the use of automated and tailored watering schedules (i.e., to avoid over-watering), and installing moisture/pressure sensors and shutoff valves to reduce or terminate irrigation under appropriate conditions (e.g., during/after precipitation events or in the event of broken pipes or sprinkler heads).
- Install “no dumping” stencils, tiles, and/or signs (per current City guidelines) at all proposed on-site storm drain inlets and catch basins to discourage illicit contaminant discharge.
- Provide storm water pollution educational materials to site owners, lessees and operators.

The described source control BMPs would help improve long-term water quality within and downstream of the site by avoiding or minimizing runoff, contaminant generation, and exposure of potential contaminants to storm flows at the source.

Priority Project BMPs – Priority project BMPs are intended to provide additional or enhanced control for facilities or uses that encompass specific targeted contaminants, and/or that exhibit increased potential for contaminant discharge. Specific priority project BMPs identified in the project SWMP include the following:

- Although two of the three would not be covered, proposed loading docks shall be sloped away from the driveways, with trench drains located at the backs of the loading areas. Trench drain filter inserts shall be installed to provide treatment prior to discharge to the storm drain.
- Equipment wash areas at restaurants (or other applicable sites) shall be indoors to prevent direct precipitation contact, and linked to the sanitary sewer system to preclude discharge into the storm drain system. Condensate drain lines shall discharge to landscaped areas if the flow is small enough that runoff will not occur.

The described priority project BMPs would help improve long-term water quality within and downstream of the SP area by avoiding or minimizing the introduction of related contaminants into the project storm drain system.

Treatment Control BMPs – Treatment control (or structural) BMPs are designed to remove pollutants from runoff to the MEP through means such as filtering, treatment or infiltration. The described use of LID site design, source control, and priority project BMPs is intended to reduce treatment requirements by preserving existing hydrologic conditions and preventing pollutants from entering storm water runoff to the MEP. Treatment control BMPs would be required for the project, however, with specific proposed measures in the project SWMP including the installation of approximately 0.44 acre of vegetated swales, and 0.69 acre of pervious pavement, and the use of FloGard® LoPro trench drain filter inserts (or other equivalent units approved by the City Engineer) at loading docks. Summary descriptions of the proposed treatment BMPs are provided below, with additional information included in the project SWMP (refer to the Drainage Management Areas Figure of the SWMP for specific locations of the proposed vegetated swales, pervious pavement areas, and loading docks).

Vegetated swales typically function by slowing runoff velocities and allowing sediment and other pollutants to settle, and also provide some infiltration capacity. Targeted pollutants include sediment, metals, and hydrocarbons (high removal efficiency); trash and organic materials (medium removal efficiency); and nutrients and pathogens (low removal efficiency). Ten-foot wide vegetated swales would be installed along the southern (Marron Road) and eastern (El Camino Real) SDP perimeters. Smaller areas of five-foot wide vegetated swales would be installed in the parking lot north of the expanded portion of the mall building.

Pervious pavement typically includes a high-permeability concrete layer underlain with materials such as crushed rock, sand, gravel, filter fabric, and appropriately permeable soil. Pervious pavement typically exhibits moderate to high removal efficiencies for pollutants including nutrients and heavy metals, and also provides some capacity for infiltration and runoff control. Pervious pavement would be installed along the southern and eastern perimeter of the parking areas, generally alongside the vegetated swales and in the reconfigured parking lot.

The identified FloGard® LoPro trench drain filter inserts consist of multi-modal facilities designed to collect silt, trash and debris, and petroleum hydrocarbons (oil and grease) from surface water runoff. They typically include a polypropylene filter element and a Fossil Rock™ filter medium for hydrocarbon retention. Such media filtration systems generally exhibit high removal efficiencies for sediment, trash and debris, metals and hydrocarbons, and a medium removal efficiency for bacteria. Trench drain filter inserts

would be installed at the loading docks since these areas would not be covered, and would treat runoff from the loading areas before it is released into the storm drain system.

Based on the described treatment BMPs identified in the project SWMP, the following measures are applicable to the proposed project:

- Approximately 0.44 acre of vegetated swales shall be incorporated into the SP area drainage system as shown on the Drainage Management Areas Figure of the project SWMP, with runoff from surface parking areas and rooftops to be directed into the on-site vegetated swales to the MEP.
- Approximately 0.69 acre of pervious pavement shall be incorporated into the SP area drainage system as shown on the Drainage Management Areas Figure of the project SWMP, with runoff from surface parking areas and rooftops to be directed into the on-site pervious pavement to the MEP.
- FloGard® LoPro trench drain filter inserts (or other equivalent units approved by the City Engineer) shall be installed in the trench drains at the back of the loading dock areas, as described in the project SWMP and shown on the associated Drainage Management Areas Figure.

BMP Maintenance – All project related BMPs shall be maintained in perpetuity by the project owner/applicant (and/or property tenants as applicable). Specific requirements shall be identified in the final SWMP and in a maintenance agreement to be approved by the City Engineer prior to issuance of any construction permits. Typical maintenance requirements for the types of BMPs identified for the proposed project include regular inspection, cleaning, and as-needed repair of applicable facilities (including pervious pavement and trench drain filter inserts); mowing, trimming, and replacement of vegetation in landscaping and vegetated swales; and removal of standing water.

4.8.5 Level of Significance after Mitigation

Implementation of Mitigation Measures WQ-1 through WQ-3 would avoid or reduce all potentially significant water quality impacts below a level of significance.

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